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Two New Species of *Polypedilum* (Diptera, Chironomidae) from Fontal Streams in Japan

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Two new species of *Polypedilum*, collected from fontal streams in Japan, are described and illustrated on the basis of the adult male and female and pupal exuvium of each.

Key Words: Chironomidae, *Polypedilum*, new species, fontal stream, Japan

Introduction

Recently, I investigated the chironomid faunae of two fontal streams arising from springs in seasonally dry river beds, one in the stream bed of the Genpei-gawa in Mishima City and the other in the bed of the Abe River in Shizuoka City, Japan. I discovered two new species of *Polypedilum* in these streams. Both species were collected only near the springs together with *Potthastia longimana* and *Dicrotendipes nipporivus*, which are known to live in clear streams (Simpson and Bode 1980; Niitsuma 1995).

There is little information available on the chironomids of clear streams in Japan, except for the Diamesinae and Prodiamesinae of mountain streams. Therefore, I will describe the adult males and females and the pupae of these two new clear-stream species in this paper.

All specimens are deposited in the Department of Biology, Faculty of Education, Shizuoka University.

The terminology for general morphology used in this paper follows Saether (1980).

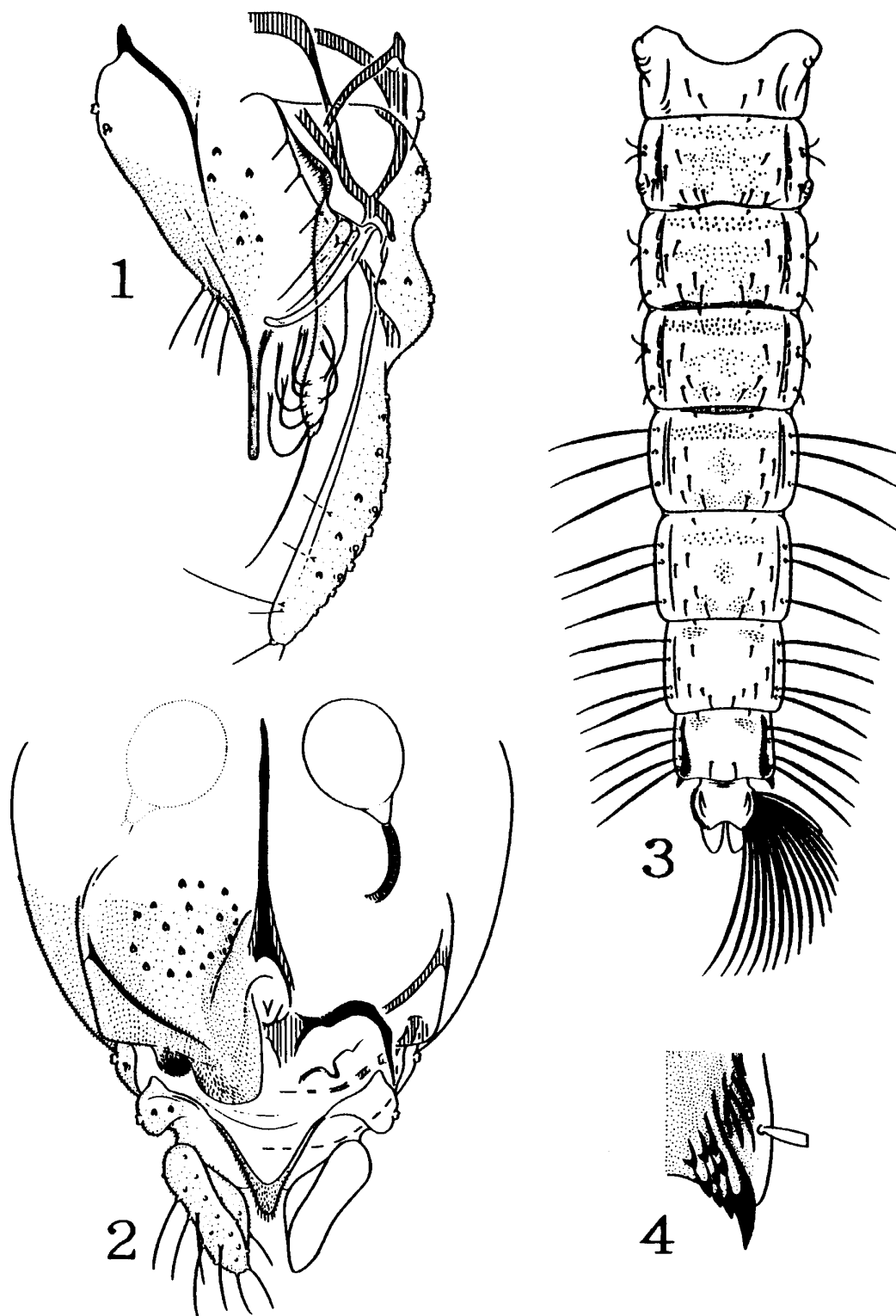
Polypedilum (*Polypedilum*) *genpeiense* sp. nov.

(Figs 1-4)

Male. Body length 2.5-3.1 mm. Wing length 1.7-2.2 mm.

Coloration quite variable among individuals. Thorax brown to dark brown on scutal vittae, preepisternum, and postnotum; usually postpronotum and anepisternum II with dark pigment. Wing without any distinct markings, but slightly tinged with grey on apical half. Front leg slightly brown, middle and hind legs yellow. Abdomen pale brown or green except for 2 or 3 brown or dark brown posterior segments. Body entirely pale yellow except for brownish postnotum in some individuals.

Head: Temporals 7-11 in number. Frontal tubercle absent. Antennal ratio 1.0-1.2.



Figs 1-4. *Polypedilum* (*Polypedilum*) *genpeiense* sp. nov. — Male (holotype): 1, hypopygium (dorsal view). — Female (paratype): 2, genitalia (ventral view). — Pupal exuvium (holotype): 3, abdomen (dorsal view); 4, caudolateral spur of abdominal segment VIII.

Clypeus with 11-15 setae. Palpus with 5 segments in proportion of 13 : 16 : 40 : 44 : 70.

Thorax: Antepnotum rather reduced, not visible from above. Scutum with 8-14 acrostichals in 2 rows, and 11-15 dorsocentrals in a row. Prealar callus with 3-4 setae in a row. Scutellum with 7-16 setae in multiple rows.

Wing: Vein R_{2+3} almost in contact with R_1 ; fCu well beyond r-m; venarum ratio 1.3. Squama with a fringe of 5-9 setae.

Legs: Front tibia with a pointed scale at apex. Sensilla chaetica present only on subapex of middle tarsomere 1, 1-3 in number. Bristle ratio 3.1-3.9 in front leg, 4.0-5.7 in middle leg, 5.7-9.0 in hind leg. Relative lengths of leg segments and leg ratios as follows:

	Co	Tr	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
Front legs	15	12	74	53	87	62	45	33	15	1.6-1.7
Middle legs	23	9	84	70	41	23	18	11	7	0.6
Hind legs	22	10	85	77	56	32	26	16	9	0.7

Hypopygium (Fig. 1): Tergite IX acute posteriorly and with a slender anal point. Gonostylus as long as gonocoxite, not pointed at apex. Superior volsella narrow and almost parallel-sided for its full length, gently curved inwards, and with 2 basal setae. Inferior volsella with a long apical seta extending caudad and 6-11 recurved setae on distal 1/4-1/3.

Female. Body length 1.9-2.3 mm. Wing length 1.7-2.4 mm.

Coloration similar to that of male except for brown abdomen.

Head: Temporals 8-11 in number. Antennae with 5 flagellomeres in proportion of 52 : 33 : 35 : 22 : 58; antennal ratio 0.4. Clypeus with 11-15 setae. Relative lengths of 1st to 5th palpal segments 16 : 18 : 42 : 47 : 79.

Thorax: Acrostichals 10-13, dorsocentrals 15-19, prealars 3-4, and scutellars 13-17 in number.

Wing: Venarum ratio 1.3. Squama with a fringe of 4-7 setae.

Legs: Tarsomere 1 of middle leg with 6-8 sensilla chaetica on distal 1/5-1/4, that of hind leg with 1-2 sensilla chaetica on distal 1/9-1/8. Bristle ratio 2.7-3.9 in front leg, 3.5-4.4 in middle leg, 4.5-6.3 in hind leg. Relative lengths of leg segments and leg ratios as follows:

	Co	Tr	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
Front legs	17	13	81	55	99	69	49	37	15	1.7-1.9
Middle legs	25	10	90	77	43	24	19	12	8	0.5-0.6
Hind legs	25	10	93	85	61	35	28	17	9	0.7

Genitalia (Fig. 2): Sternite VIII with 14-21 setae on each side. Gonapophysis VIII divided into large dorsomesal lobe and small ventrolateral lobe. Apodeme lobe weak, sinuate. Gonocoxite IX with 2-4 setae. Segment X with 4-6 setae. Notum 124-142 μ m long. Seminal capsule oval, 71-78 μ m long, 53-63 μ m wide. Postgenital plate triangular, rounded at apex.

Pupa (based on holotype). Body length 3.3-4.0 mm.

Cephalothorax: Frontal apotome smooth, with frontal setae; frontal warts and tubercles absent. Thorax without distinct dorsal reticulation.

Abdomen (Fig. 3): Tergites I and IX without shagreen; II-VI with anterior

transverse band of shagreen; central parts of II-IV with more or less extensive shagreened patch, of V-VI with small rounded patch of shagreen; III-VI with posterior pair of shagreened patches, merging with central shagreened area in some individuals; VII-VIII with weak anterolateral pair of shagreened patches. Tergite II with row of 47-72 posterior hooklets. Conjunctivae III/IV and IV/V with transverse rows of spinules. Pedes spurii A strong on sternite IV, occasionally weak on V. Pedes spurii B distinct on segment II. Segment VIII with pair of caudolateral spurs, each composed of one large spine and several small spines (Fig. 4). Anal lobe with fringe of 19-24 lamelliform setae.

Larva. Unknown.

Type material. Holotype: ♂, emerged in the laboratory on 10. V. 1994 from a sample of bottom sediment collected from a fontal stream in dry stream-bed of the Genpei-gawa in Mishima City, 24. IV. 1994, and slide-mounted in Canada Balsam with the associated pupal exuvium, which is to be considered part of the holotype. Paratypes: 1 ♂, same data as holotype (emerged on 6. V. 1994); 3 ♂♂, 1 ♀, 3 pupal exuviae, same locality as holotype, 20. V. 1995 (adults emerged in the laboratory on 1-6. VI. 1995); 2 ♂♂, 4 ♀♀, 2 pupal exuviae, same locality as holotype, 24. X. 1995 (adults emerged in the laboratory on 26. X-6. XI. 1995).

Distribution. Japan (Shizuoka Pref.)

Remarks. This new species resembles *P. medivittatum* Tokunaga, 1964 (nom. correct. pro *P. medivittatus*) from Micronesia in the structure of the male hypopygium, especially of the acute posterior portion of tergite IX, and the bare and slender horn-like process of the superior volsella, but the new species may be distinguished from the latter by the low value of the male antennal ratio 1.0-1.2, the plate-like base of the superior volsella, and the relatively short apical seta of the inferior volsella (in *P. medivittatum*, male antennal ratio 1.81-1.96, base of superior volsella triangular, apical seta of inferior volsella very long and extending caudad as far as tip of gonostylus, according to Tokunaga 1964).

***Polypedilum (Polypedilum) aberufobrunneum* sp. nov.**
(Figs 5-10)

Male. Body length 4.3-5.0 mm. Wing length 2.5-2.9 mm.

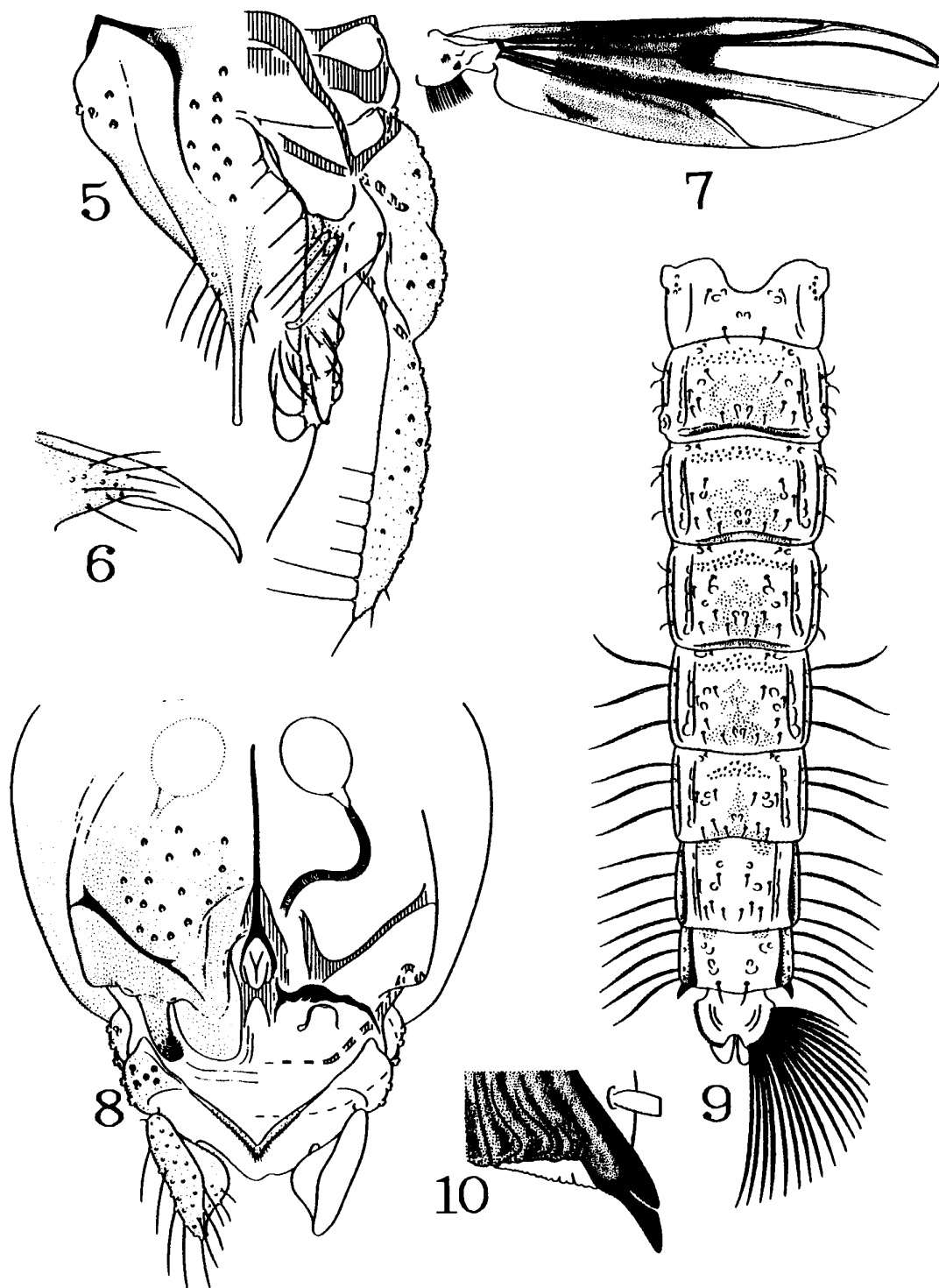
Coloration largely reddish-brown on thorax, pale green on abdomen. Thorax dark brown along rows of dorsocentrals and on postnotum and halteres. Wings with 2 small dark spots at vein r-m and fCu. Legs largely pale yellow, but brown on all coxae and front tarsomeres 4-5, dark brown on apical 2/3 of front femur, front tibia, middle femur, and basal 1/4 of middle tibia. Hypopygium brown.

Head: Temporals 12-17 in number. Frontal tubercle minute, 2-6 μ m long, 2-5 μ m wide. Antennal ratio 2.1-2.3. Clypeus with 32-47 setae. Palpus with 5 segments in proportion of 20 : 25 : 64 : 58 : 91.

Thorax: Antepronotum reduced, not visible from above. Scutum with 19-30 acrostichals in 2 rows, and 26-36 dorsocentrals in 1-2 rows. Prealar callus with 6-9 setae in a row. Scutellum with 25-33 setae in multiple rows.

Wing: Vein R_{2+3} distinct from R_1 ; fCu hardly beyond r-m; venarum ratio 1.0-1.1. Squama with a fringe of 20-26 setae.

Legs: Front tibia with a pointed scale at apex. Sensilla chaetica present only on



Figs 5-10. *Polypedilum* (*Polypedilum*) *aberufobrunneum* sp. nov. — Male (holotype): 5, hypopygium (dorsal view); 6, apex of abdominal tergite IX with anal point (lateral view). — Female (paratype): 7, wing; 8, genitalia (ventral view). — Pupal exuvium (holotype): 9, abdomen (dorsal view); 10, caudolateral spur of abdominal segment VIII.

subapex of middle tarsomere 1, 1-4 in number. Bristle ratio 2.9-3.6 in front leg, 4.6-6.5 in middle leg, 7.1-8.8 in hind leg. Relative lengths of leg segments and leg ratios as follows:

	Co	Tr	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
Front legs	8	7	44	33	48	34	27	22	8	1.4-1.5
Middle legs	12	5	46	39	24	15	11	6	4	0.6-0.7
Hind legs	13	5	50	45	34	21	17	11	5	0.7-0.8

Hypopygium (Figs 5-6): Tergite IX acute posteriorly, and with a slender anal point. Gonostylus slender, 5.0-6.5 times as long as wide, and pointed apically. Superior volsella broad at base, tapering toward apex, inwardly curved near the base and bearing a seta on the outer corner; basal setae 2-4 in number. Inferior volsella with a long apical seta extending caudad and 12-15 recurved setae on distal $1/4$ - $1/3$.

Female. Body length 2.4-3.2 mm. Wing length 2.3-3.0 mm.

Coloration darker than that of male. Wings with a basal broad, dark band (Fig. 7). Legs mainly pale yellow. Front leg brown on coxa and tarsomeres 4-5, dark brown on apical $4/5$ - $5/6$ of femur and full length of tibia. Middle and hind legs brown on coxae, dark brown on femora and basal $1/3$ - $2/3$ of tibiae. Abdomen entirely brown to dark brown.

Head: Temporals 15-18 in number. Minute frontal tubercles present or absent. Antennae with 5 flagellomeres in proportion of 60 : 42 : 48 : 27 : 79; antennal ratio 0.4-0.5. Clypeus with 41-68 setae. Relative lengths of 1st to 5th palpal segments 25 : 29 : 68 : 66 : 107.

Thorax: Acrostichals 26-35, dorsocentrals 39-58, prealars 9-15, and scutellars 28-46 in number.

Wing: Venarum ratio 1.0-1.1. Squama with a fringe of 17-31 setae.

Legs: Sensilla chaetica present only on distal $1/6$ - $1/4$ of middle tarsomere 1, 13-22 in number. Bristle ratio 2.5-3.3 in front leg, 2.7-3.3 in middle leg, 5.0-5.9 in hind leg. Relative lengths of leg segments and leg ratios as follows:

	Co	Tr	Fe	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	LR
Front legs	9	7	50	36	58	38	30	24	9	1.5-1.7
Middle legs	14	5	52	44	26	16	12	7	4	0.6
Hind legs	14	5	54	50	37	22	18	11	5	0.7-0.8

Genitalia (Fig. 8): Sternite VIII with 16-19 setae on each side. Gonapophysis VIII divided into large dorsomesal lobe and ventrolateral lobe; ventrolateral lobe longer than wide. Apodeme lobe weak, strongly sinuate. Gonocoxite IX with 4-7 setae. Segment X with 8-12 setae. Notum 147-167 μ m long. Seminal capsule oval, 87-92 μ m long, 71-82 μ m wide. Postgenital plate triangular.

Pupa (based on holotype). Body length 5.3-6.5 mm.

Cephalothorax: Frontal apotome weakly rugose with frontal setae; frontal warts and tubercles absent. Thorax with weak dorsal reticulation.

Abdomen (Fig. 9): Tergites I and IX without any shagreen; II-VI with anterior transverse band of shagreen consisting of strong spines; II-V with more or less extensive, central shagreened patch, VI with weak, central shagreened patch, but in

some individuals central shagreened patch of VI separated into median longitudinal or round patch and posterior transverse band; VII-VIII with weak anterolateral pair of shagreened patches. Tergite II with row of 66-91 posterior hooklets. Conjunctivae III/IV and IV/V with transverse rows of spinules, in some individuals spinulated area of conjunctiva III/IV interrupted narrowly or widely in the middle. Pedes spurii A strong on sternite IV, weak on V-VII. Pedes spurii B distinct on segment II. Segment VIII with pair of caudolateral spurs, each composed of one large spine and 0-3 small spines (Fig. 10). Anal lobe with fringe of 34-47 lamelliform setae.

Larva. Unknown.

Type material. Holotype: ♂, emerged in the laboratory on 15. VI. 1995 from a sample of bottom sediment collected from a fontal stream in the dry river-bed of the lower reaches of the Abe River in Shizuoka City, 7. VI. 1995, and slide-mounted in Canada Balsam with the associated pupal exuvium, which is to be considered part of the holotype. Paratypes: 10♂♂, 11♀♀, 9 pupal exuviae, same data as holotype (adults emerged on 15-29. VI. 1995).

Distribution. Japan (Shizuoka Pref.)

Remarks. This new species is closely related to *P. tochibicolor* Niitsuma, 1991 in the coloration of the thorax and abdomen and the structure of the superior volsella, but it is easily distinguished from the latter by the dark markings of the wings and legs and by the slender gonostylus of the male hypopygium (in *P. tochibicolor*, wings without markings, legs largely yellow to pale brown, at most brown on coxae, trochanters, and tarsomeres 3-5, gonostylus of male hypopygium rather stout and about 4 times as long as wide, according to Niitsuma 1991). Both species differ from each other in the structure of the female genitalia, too. The ventrolateral lobe of the new species is very large and longer than wide, while that of *P. tochibicolor* is relatively small and shorter than wide.

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